

HEPFacilities/Instruments Data-Intensive Science: Case Studies Template for ASCR

1.1 Background

This response is for the Minos/Minos+ experiment at Fermilab.

See <http://www-numi.fnal.gov/index.html>

1.1.1 Resources/Instruments and Facilities (As Applicable)

Minos computing support is well described in the recent SCP/PPM review.

<https://cdcv.s.fnal.gov/redmine/attachments/download/8612/SCPMT13-MINOS.pdf>

The detector and Scientific program are described at

<http://www-numi.fnal.gov/index.html>

1.1.2 Data-Driven Process of Science

Minos is a traditional HEP experiment. See the SCP/PPM review for details.

1.1.3 Tools and Resources Used

Simulation data makes up the bulk of Minos stored files.

See details in the SCP/PPM review.

We use GlideinWMS for workflow management.

1.1.4 Analysis Software

The custom Minos offline analysis framework is built on standard HEP toolkits: SoftRelTools, root, etc.

Real time response is needed only in the Data Acquisition systems.

Data reconstruction and Physics analysis is mainly done at Fermilab.
All Simulation data is produced at the collaborating institutions,
and imported to Fermilab.

All analysis is performed on the Fermilab OSG grid system,
supplemented by personal laptops.
Several infrastructure servers run in the Fermicloud system.

1.1.5 Collaboration

Minos is a traditional collaboration of 28 institutions -

<http://www-numi.fnal.gov/collab/institut.html>

We communicate through

Weekly working group meetings, usually via ESNET Readytalk.

Collaboration meetings a few times a year, usually 4 days.

An annual week long workshop.

Document management via D0cDB and Redmine WIKIs.

1.2 *Future environment 2-5 years*

Minos+ takes data through 2016, and continue analysis for a few more years. See details in the SCP/PPM review.

1.2.1 Analytics Questions

Minos+ plans to continue with the present Analytics model.

1.2.2 Are there new questions that are impossible or impractical to answer

There are always analysis topics which could be pursued with more computing and storage resources. The mainline approved physics program is being pursued effectively with available resources.

1.2.3 Major roadblocks – open questions

The present computing limits are at about 5000 cores of computing, and about 500 MBytes/sec network bandwidth.

1.2.4 Benefit if solved

It may be possible to identify particular channels (ν_e and ν_τ) that could be addressed with substantially larger computing resources.

1.3 Projections of data volume and processing needs

Minos+

	2013 Projected need	2015 Projected need	2018 Projected need
Data Rates (GB/sec)	0.5	0.5	1
Mode: burst/stream	stream	stream	stream
Total volume (TBs) before reduction: per day/year	0/2	0/2	0/2
Total volume (TBs) after reduction: per day/year	0/7	0/10	0/10
Total volume per experiment or simulation run (TBs)	20	20	20
Main processing mode: Central/User	central	central	central
Total storage per year (TBs): Local/Remote	e.g. 200/1,000	e.g. 400/2,000	e.g. 2,000/10,000
Shared data volume per year (TBs): (transfer to other locations)	20	20	20
Local Analysis Processing requirements (range of number of cores)	2000-5000,	2,000-5,000	1000-3000
Remote Analysis Processing requirements (range of number of cores)	200-1000	200-1000	200-1000